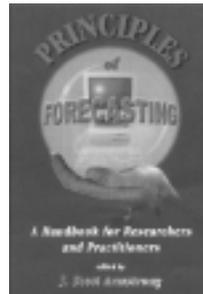


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A New Forecasting Reference Work

by Peter T. Ittig, University of Massachusetts, Boston

Kluwer Academic Publishers has been issuing state-of-the-art summaries of great interest and benefit to the decision sciences community. These include their *Encyclopedia of Operations Research and Management Science*, edited by Gass and Harris, and the *Encyclopedia of Optimization*, edited by Floudas and Pardalos. Below we review another important volume in that series.



Principles of Forecasting: A Handbook for Researchers and Practitioners,
J. Scott Armstrong, ed.

Kluwer, 849 pages,
2001
www.wkap.nl

THIS BOOK REPRESENTS a significant contribution to the forecasting literature as it pursues a grand ambition: “to summarize knowledge of forecasting as a set of principles.” Armstrong poses a set of 139 principles, which are summarized in section 20 of the book (in my opinion this list could have been included earlier). The principles are supported by 30 articles written by 40 authors and co-authors who discuss the principles as well as the accompanying evidence for each. The supporting citations from the literature of forecasting are extensive and provide a good starting point for anyone wishing to do serious research on forecasting. A number of prominent individuals in the forecasting field have contributed papers, which vary considerably in readability and utility. Some papers will make valuable supplemental readings for courses on business forecasting, marketing research or econometrics. The papers by Armstrong are characteristically direct, practical, and occasionally humorous.

The emphasis of the book differs substantially from that of a text on forecasting. Much of the mathematical material usually found in forecasting textbooks is not presented in this 849-page volume. Fur-

ther, most of the papers are *not* about standard time-series extrapolation, which tends to dominate the forecasting texts. For example, only one of the 20 sections is devoted explicitly to time series extrapolation and only two pages of that section are devoted to issues of seasonal adjustment. Substantial attention is devoted to the structured use of judgment in forecasting, and some topics will be of particular interest to individuals in marketing (e.g., the article on conjoint analysis by Wittink and Bergstuen, the article on forecasting market share by Brodie, Danaher, Kumar and Leeftang, and the article on forecasting trial sales by Fader and Hardie). The paper by Armstrong on judgmental bootstrapping (using regression to predict expert decisions) is quite good. The conclusion that judgmental bootstrapping “generally improves upon the accuracy of an expert’s forecasts” will be a surprise to many. There is a forecasting glossary at the end of the book, but a reader who is outside the field may have difficulty with some sections. For this reason, the book will be of greatest value to persons who are knowledgeable in the field of forecasting.

The section on extrapolation is very good, though the portion on seasonal adjustment was a bit disappointing to this reviewer. One of the principles (# 5.6) recommends that forecasters “use multiplicative seasonal factors for trended series” in many circumstances and the extrapolation section refers to the standard “ratio-to-moving-average method” to obtain these factors. In my work (cited in the Extrapolation section) I showed that the standard ratio-to-moving-average procedure con-



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tains a systematic error when a trend is present in the data. Alternative methods are available for obtaining multiplicative seasonals that *are* consistent with a trend, as I described in my 1997 paper in *Decision Sciences* and in my paper in the *2001 Decision Sciences Institute Proceedings*. The Extrapolation section of the handbook criticizes the census seasonal adjustment program as “disappointing for forecasters” because it has become “more difficult to understand” and because “researchers have done little work to show how the changes affect forecasting.” The section is also critical of Box-Jenkins procedures and refers to “the failure of Box-Jenkins” in comparative studies. This is consistent with the principle (# 7.1) that simplicity in forecasting methods should be favored over complexity. The simplicity principle is repeated throughout the book, as in the section on econometric methods by Allen and Fildes, which states that “an all-too-common occurrence is to discover that an econometric model gives worse forecasts than the naïve no change method or than exponential smoothing.”

Section 19 contains a useful review of forecasting software by Tashman and Hoover in relation to adherence to the principles. An important exception is that there is no review of demand management software due to a lack of cooperation from the sellers of these expensive programs. Such programs typically forecast demand and also forecast the consequences of various games that may be played with pricing schemes. If you have purchased an airline ticket in recent years, you may have experienced the dynamic price-discrimination aspect of these programs. There is a good chance that the person sitting next to you on the airplane paid a different price than you did. This forecasting/pricing problem is *very* hard, and the vendors of these programs have generally not been willing to subject them to independent testing. Hopefully, these programs have only annoyed air travelers and have not contributed to the losses sustained by many airlines in recent years. The software that *was* reviewed includes spreadsheet add-ins, statistical programs, and separate business forecasting packages. The authors make a number of suggestions for the improve-

ment of these programs to make them more useful and more transparent. They particularly criticize the tendency of developers to “view program features and even program calculations as proprietary, not to be subjected to the scrutiny of clients, competitors, and reviewers.” In support of the simplicity principle, the authors state that,

We have not considered software for multi-equation econometric modeling, both because of its highly specialized features and because it has yet to be shown that multi-equation models add value in forecasting.

Section 19 also contains useful reviews by Cox and Loomis of forecasting textbooks in relation to their adherence to the principles. It is fascinating to see that the authors of popular texts ignore and sometimes disagree with widely accepted principles of forecasting. For example, not all books adhere to the principle (# 13.26) that forecasting methods should be compared on the basis of true forecast accuracy rather than fit accuracy. This is a fundamental point that is variously referred to as *ex ante* vs. *ex post* accuracy, or out-of-sample accuracy vs. within-sample accuracy. Proper comparisons require holding back some of the data to determine how well various methods perform in forecasting that data. A sufficiently complex function or method will be able to track any set of historical data accurately, but will not necessarily forecast the future very well.

Another fundamental principle (# 7.1) that is not always shared by texts is that simplicity in forecasting methods should be favored over complexity. Armstrong comments that, “Many analysts find this principle to be counterintuitive.” The authors of the textbook review also report that texts also sometimes disagree with the principle (# 7.4), “Do not forecast cycles.” Economists seem to have particular difficulty with this one. The prediction of series driven by markets is profoundly difficult. The prediction of turning points in such series is even more difficult.

This is *not* a textbook, and at \$190 per copy, it is a relatively expensive desk reference. The book is available on-line for a slightly lower price of \$142 (<http://forecastingprinciples.com/handbook.html>). Forecasters may wish to ask their

institution’s library to order a copy. The book will probably have an impact on the development of the forecasting field for years to come.

The supporting Web site is helpful. Forecasters should add the site to their bookmarks/favorites list (<http://forecastingprinciples.com>). The “What’s New” page refers to additions and corrections to the text and other supporting material (<http://www-marketing.wharton.upenn.edu/forecast/handbook.html#Corrections>). A “Forecasting Audit” utility allows forecasters to check their forecasting procedures against the principles (<http://www-marketing.wharton.upenn.edu/forecast/fal>). ■

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